Ecosystems of BC

Lakes, Rivers, and Wetlands

Cooper Lake, BC, Craig Stephani

British Columbia has a rich diversity of water bodies such as small salt lakes, large freshwater lakes, rivers, streams and wetlands. These different water bodies have some similarities but many differences.

Lakes can be large or small, freshwater or saltwater, but all have still water and are surrounded by land. Some lakes have a river or stream flowing in or out of them. There are many different types of lakes in BC including the small salt lakes which can be found in the interior, and large freshwater lakes such as Atlin Lake in northern BC, the largest natural freshwater lake in the province. BC has salty warm lakes that dry out in the summer in the Southern Interior and cold alkali lakes such as Boya Lake in northern BC that is clear and cold and covered in ice for several months of the year. Many of the salt lakes dry out during the summer while lakes at high elevations may be covered in ice for all but a few months a year.

Rivers and streams are flowing bodies of water. They usually start from lakes, springs, or wetlands. BC's rivers drain into the Pacific Ocean through the Columbia River in the south or through the Fraser River in the west. In the north, water drains through the Liard and Peace Rivers systems to the Beaufort Sea. Some of the streams in BC are quite big and will run year-round but others are very small and will dry out for part of the year. Streams that only have

water during part of the year are often called seasonal streams. Just because there isn't always water in them, doesn't mean they can't be impacted by invasive species. Shrubs including red-osier dogwood, willows, and trees including black cottonwood and spruce typically grow along the edges of many rivers and streams.

Wetlands are smaller bodies of water that have unique vegetation, are not very deep, and may not stay wet all year. There are many types of wetlands including ponds, fens, swamps, bogs, and marshes. Wetlands are very important because they filter and clean our water and protect against floods. Cattails and other native plant species grow in and around wetlands, providing food and homes to many amphibians, reptiles, and birds that rely on them.

Native species depend on our lakes, streams, and wetlands. Salmon, trout, and other fish need the spawning and rearing habitat that rivers and lakes provide. Amphibians like the western toad require a watery habitat to complete their life cycle. Muskrats and beavers also build their homes in these areas. Songbirds, ducks, and birds of prey (such as the northern harrier) use these wet areas to find food, nest, or rest. Tiny animals like snails, insects, and other invertebrates are a vital part of wetlands, breaking down dead plants and animals and providing food for larger animals.

Broadleaf cattail, Stephen McWillian, iNaturalist.ca

Northern harrier, Jonathan Eisen, iNaturalist.ca

Which invasive species are in lakes, rivers, and wetlands?

As with terrestrial (land-based) invasive species, aquatic invasive species are more common in areas with more human development because they are usually introduced by people, either accidentally or intentionally. Aquatic species that are introduced to one place in a watershed have the potential to spread throughout the downstream areas of that watershed, and possibly upstream as well by moving in water. These invasive species are almost impossible to get rid of once introduced.

Two laws help prevent introduction and spread of aquatic invasive species:

- It is illegal in BC to use live fish for bait or hold live fish in a “live well” on your boat.
- It is illegal to possess or move live fish without a permit.

Below we have described a few of the invasive species that are of concern in BC either because we already have these species in some places and want to prevent their spread, or because we don't have them in BC and would like to keep it that way.

Yellow perch have been introduced illegally to lakes in the Southern Interior, Vancouver Island, the Kootenays, and Northern BC, including the Peace region. Yellow perch females produce thousands of eggs for every 2.5 cm length of their body. Yellow perch are able to adapt to a wide variety of lake environments. The only way that yellow perch could have gotten into these lakes is by people introducing them. People mistakenly believed it was okay to do this because they wanted to be able to fish for them or because they are eaten by other introduced species such as bass. Unfortunately, yellow perch harm our native fish populations by feeding on trout and salmon fry.

The **New Zealand mudsnail** is an invasive species that has recently made its way to BC, probably on recreational vehicles, boats and trailers. This tiny (3-5mm long) snail can reach populations of 500,000 per square metre. It eats algae off rocks and mud in streams, lakes and estuaries. Research has yet to document exactly how the New Zealand mudsnail impacts natural ecosystems but one possibly way is by changing the diet of trout. Although trout eat New Zealand mudsnails, they can pass through their digestive system without being digested or killed. That means they are not really 'food' for the trout. The usual food of trout is digested and turned into calories and nutrients for the trout. If they fill up on this 'junk food' they might not be as healthy and strong as they would be if they were eating their usual diet of insect larvae.

Eurasian watermilfoil is a fast-growing plant that can grow even from tiny pieces. It can grow in very thick mats and has an impact on boaters and swimmers as well as fish. Like other invasive species, it can quickly replace native species in the area. Wildlife that feeds on those native species then has to move elsewhere to find food because often, they won't recognize the invasive species as food. In BC, Eurasian watermilfoil is found in some of the large Southern Interior lakes such as Shuswap, Mara, Christina, and Champion Lakes, as well as in the Columbia and Kootenay Rivers and Nicola Lake. Eurasian watermilfoil is also found in some locations on the Lower Mainland, in the Okanagan Valley, and on Vancouver Island. Eurasian watermilfoil has been transported between lakes on boats, jet skis, boat trailers, and other water toys. Plant fragments are picked up at one lake and, if people don't clean off their boats and equipment, are dropped off in the next lake they visit. It is important to be aware of these aquatic hitchhikers and always remove any plant material, mud, or other hitchhikers from anything that has been in the water so that they aren't transported to another place

Zebra and quagga mussels are freshwater mussels that live on underwater surfaces. They aren’t currently in BC and we want to keep it that way. Both species have a large impact on native species since a colony of these mussels can completely cover underwater surfaces and push out native plants and animals. As well, they can cause a large reduction in dissolved oxygen that other animals need. Another serious impact of these mussels is a result of how they

grow on underwater surfaces. They grow so thick on the inside of water pipes that they can clog them up. It is very expensive to remove them because the pipes are underwater and are not easy to reach. In places where these mussels have invaded, people have spent hundreds of millions of dollars to deal with the problems the mussels have caused.

Quagga and zebra mussels probably came to North America in the bilge water of tanker ships. Now they can spread to BC by hitchhiking with people. If they are attached to a boat that comes to one of our lakes, they can start a whole new colony. It is very important to inspect boats, trucks and trailers and remove any plants, mud or critters and creatures that might be stuck to them, before and after being in the water. This way we will prevent the introduction of these invasive species.

American bullfrogs were brought to BC to farm as a food source for their meaty legs, but when the bullfrog farms closed down the frogs were released into nearby wetlands. These large frogs can grow to the size of dinner plates and eat native frogs, birds, snakes, and other animals. Predation on other wetland species is the main ecosystem impact of bullfrogs.

Whirling disease is an invasive disease that affects native fish like trout, salmon, and whitefish. It's caused by a parasite that lives in freshwater and needs two animals to complete its life cycle: a tubifex worm and fish from the salmon family. The parasite can damage the fish's nervous system and bones, especially in young fish. This can make the fish swim in circles, which is where the name "whirling disease" comes from. The disease can make it harder for the fish to eat, escape predators, or survive in the wild. Whirling disease is usually spread from lake to lake when people don't properly clean and dry their boats or by fishing with bait that is infected with the disease.

Yellow perch, Fizzishin, iNaturalist.ca

Eurasian watermilfoil, Chris Evans, Bugwood.org

Not so fast! What are you doing with your aquarium pets?

Another source of invasive species is aquarium pets and aquarium water being dumped into our lakes, rivers and wetlands. Species like crayfish, frogs, turtles, goldfish, pumpkinseed fish, and plants from aquariums may become invasive. If they are set free in our lakes, rivers and

streams, they can cause a serious and irreversible problem. Even the aquarium water may have plants and animals that are too small to see but can still cause big problems when they are set free in local lakes or streams. People may think “what could be the harm of setting this one animal free?” Invasive species have already caused the extinction of some native species in BC lakes.

For example, there is a unique type of stickleback fish that is only found in several small lakes on the south coast of BC. This endangered fish is called the **benthic and limnetic stickleback species pair**. Their long name describes their interesting natural history. The benthic and limnetic stickleback species pairs are different from other sticklebacks common in freshwater and marine habitats throughout the Northern hemisphere. Each “pair” is composed of two very closely related sticklebacks that live together in the same lake but don’t interbreed: the benthics and limnetics. Benthics are larger sticklebacks that feed on invertebrates like snails and worms in the shallow lake bottom sediments (the benthic zone of the lake). The limnetics are sleek and smaller sticklebacks who eat plankton from the deeper lake waters (the limnetic zone of the lake). Stickleback species pairs from different lakes are distinct from each other and are considered separate species. Because of their unique biology, genetics, and evolutionary history, stickleback species pairs are studied by scientists around the world. Yet they are vulnerable and at risk of extinction when invasive species are introduced. In fact, two of the five types of stickleback species pairs went extinct due to the introduction of aquatic invasive species. The stickleback species pair in Hadley Lake on Lasqueti Island went extinct within five years after the introduction of brown bullhead, an invasive catfish. And when signal crayfish were introduced to Enos Lake on Vancouver Island, the ecosystem changed in ways that led to interbreeding between the benthics and limnetics, causing the collapse of the species pair. When a new species is introduced into these carefully balanced ecosystems, sticklebacks suddenly have to compete with them for food and habitat, evade a new predator, or may have their water quality altered.

Rusty crayfish may be purchased by schools for science class aquariums and projects. After the studies are done, the question is “what do you do with the crayfish?” It is a living thing and people might think the best thing to do is to put it back in the natural environment “where it came from.” The problem is that it didn't come from a natural ecosystem in BC. Rusty crayfish are not native to BC. They are native to streams in parts of the United States. After rusty crayfish have been released into new streams they are almost always able to outcompete native species.

Rusty crayfish are bigger and eat more for their size than native crayfish. They eat the plants and animals that provide cover and nutrients for smaller native crayfish and fish. Rusty crayfish are very successful in new streams and lakes and that is not a good thing.

The only way that the rusty crayfish can get into our streams is if we let them go there. There are many other invasive species that might be in your home or school aquarium. Never release any aquarium pet or the water you keep it in. The water from an aquarium should be poured onto dry ground. Aquarium pets are trickier to deal with because they are living things. A crayfish can live for 2 -3 years. The most humane way to dispose of aquarium pets (if they can't be given to another person with an aquarium, a pet store, or a rescue organization) is to put them in a

freezer. People who dispose of their aquarium pets and water responsibly prevent the introduction and spread of invasive species and, in turn, save many of our native species.

For more information on the species mentioned, visit ISCBC's website.